In the CLAIMS

1. (Previously Presented) A reflecting device having electrically controllable, variable reflection, comprising:

a composition comprising a periodic array of liquid crystal disposed in a polymer matrix, the liquid crystal having an index of refraction that is variable in response to an applied electric field, wherein the index of refraction of the liquid crystal array and the index of refraction of the polymer matrix, n_p are mismatched at least at a first, a second and a third applied electric field strengths, the first, second and third field strengths of increasing magnitude, further wherein a characteristic wavelength reflection varies between the first and third applied field, and a characteristic reflectance intensity varies between first and second applied field and varies between the second and third applied field;; and

a pair of electrodes positioned to apply an electric field across the composition and capable of applying said continuous selection of electric field strength.

2. (Previously Presented) The reflecting device of claim 1, wherein the first applied electric field strength is zero.

3. (Previously Presented) The reflective device of claim 1 or 2, wherein the second applied electric field strength is sufficient to substantially align the liquid crystal droplets.

4. (Original) The reflective device of claim 1, wherein the device possesses at least two reflection wavelengths, each reflection wavelength associated with a different applied field strength.

5. (Original) The reflective device of claim 1, wherein the liquid crystal has an ordinary index refraction n_0, and an extraordinary index of refraction, n_e, and the polymer has a refractive index, n_p, and where $n_o \neq n_p$.

6. (Original) The reflective device of claim 1, wherein the liquid crystal has an ordinary index of refraction n_o, and an extraordinary index of refraction, n_e, and the polymer has a refractive index, n_p, and $n_e > n_p > n_o$.

7. (Original) The reflective device of claim 1, wherein the liquid crystal has a positive dielectric anisotropy.

8. (Original) The reflective device of claim 1, wherein the liquid crystal has a negative dielectric anisotropy.

9. (Original) The reflective device of claim 1, wherein the liquid crystal has a dielectric anisotropy dependant upon applied field frequency.

10. (Original) The reflecting device of claim 1, wherein the device is selected from the group consisting of waveguide gratings, switchable lenses, switchable filters, optical add-drop multiplexers and attenuators.

11. (Original) The reflecting device of claim 1, further comprising:

a power source in electrical communication with the electrodes for generating the electric field.

12. (Original) The reflective device of claim 1, wherein the electrode comprises a conductive layer in electrical communication with the composition.

13. (Original) The reflective device of claim 12, wherein the conductive layer comprises indium titanium oxide (ITO).

14. (Original) The reflective device in claim 1, wherein the electrode comprises a metallic electrode.

15. (Withdrawn) A reflecting device having electrically controllable, variable reflection, comprising:

first and second electrodes having a holographic polymer dispersed liquid crystal (H-PDLC) film disposed therebetween, the H-PDLC film comprised of layers of liquid crystal and polymer matrix, the liquid crystal layer having a first average index of

refraction, $<n_{LC}>_1$, at a first applied electric field strength and a second average index of refraction, $<n_{LC}>_2$, at a second applied electric field strength, wherein the $<n_{LC}>$'s of the liquid crystal and the index of refraction of the polymer matrix, n_p, are mismatched at both the first and second applied electric field strengths.

16. (Withdrawn) The reflecting device of claim 15, wherein the first applied electric field strength is zero.

17. (Withdrawn) The reflecting device of claim 15 or 16, wherein the second applied electric field strength is sufficient to substantially align the liquid crystal droplets.

18. (Withdrawn) The reflecting device of claim 15 or 16, wherein the liquid crystal further comprises a third $<n_{LC}>$ substantially equal to n_p at a third applied electric field strength.

19. (Withdrawn) The reflecting device of claim 15, wherein the device possesses at least two reflection wavelengths, each reflection wavelength associated with a different applied field strength.

20. (Withdrawn) The reflecting device of claim 15, wherein the device possesses at least three different color states, each color state associated with a different applied field strength.

21. (Withdrawn) The reflecting device of claim 15, wherein the index mismatching conditions results in a shift in the bandwidth of reflected light, as the device liquid crystal moves from a state having a $<n_{LC}>_1$ to a state having a $<n_{LC}>_2$.

22. (Withdrawn) The reflecting device of claim 15, wherein the liquid crystal has an ordinary index of refraction, n_o, and an extraordinary index of refraction, n_e, and the polymer has a refractive index , n_p, and where $n_o \neq n_p$.

23. (Withdrawn) The reflecting device of claim 15, wherein the liquid crystal has a positive dielectric anisotropy.

24. (Withdrawn) The reflecting device of claim 15, wherein the liquid crystal has a negative dielectric anisotropy.

25. (Withdrawn) The reflecting device of claim 15, wherein the liquid crystal has a dielectric anisotropy dependent upon applied field frequency.

26. (Withdrawn) The reflecting device of claim 15, wherein the device is selected from the group consisting of waveguide gratings, switchable lenses, switchable filters, optical add-drop multiplexers and attenuators.

27. (Withdrawn) The reflecting device of claim 15, further comprising:

a power source in electrical communication with the electrodes for generating the electric field.

28. (Withdrawn) The reflecting device of claim 15, wherein the electrode comprises a conductive layer in electrical communication with the composition.

29. (Withdrawn) The reflecting device of claim 28, wherein the conductive layer comprises indium titanium oxide (ITO).

30. (Withdrawn) The reflecting device of claim 15, wherein the electrode comprises a metallic electrode.

31. (Withdrawn) A grating having electrically controllable, variable peak wavelength, comprising:

a periodic array of diffractive planes in a supporting matrix, said planes forming a grating spaced at a distance on the order of a wavelength of light and having an optical thickness responsive to an applied electric field;

first and second electrodes for applying first and second applied electric field strengths across the grating;

wherein the first and second electric field strengths alter optical thickness to alter peak wavelength of reflected light.

32. (Previously Presented) A reflecting device having electrically controllable, variable reflection comprising:

a periodic array of liquid crystal disposed in a polymer matrix, the liquid crystal having an index of refraction variable in response to an applied electric field; and

means for applying an electric field across the device to provide applied electric field strengths,

wherein index of refraction of the liquid crystal and the index of refraction of the polymer matrix, n_p, are mismatched at said applied electric field strengths at least at a first, a second and a third applied electric field strengths, said continuous selection of electric field strength, said index mismatching being a function of the degree of orientation of the liquid crystal and the degree to which liquid crystal are separated during holographic formation the first, second and third field strengths of increasing magnitude, further wherein a characteristic wavelength reflection varies between the first and third applied field, and a characteristic reflectance intensity varies between first and second applied field and varies between the second and third applied field.

33. (Withdrawn) A method of varying the optical thickness of a reflecting device, comprising:

providing a reflecting device comprising a periodic array of liquid crystal in a polymer matrix, the liquid crystal array having an index of refraction variable in response to an applied electric field; and

altering the electric field strength across the H-PDLC film between the first and second applied electrical field strengths, wherein the indices of refraction of the liquid crystal are mismatched with the index of refraction of the polymer matrix at both the first and second applied electrical field strengths.

34. (Withdrawn) The method of claim 33, wherein the reflecting device comprises first and second substrates having a holographic polymer dispersed liquid crystal (H-PDLC) film disposed therebetween, the H-PDLC film comprised of layers of liquid crystal and polymer matrix.

35. (Withdrawn) The method of claim 33, wherein the liquid crystal has an ordinary index of refraction, n_o, and an extraordinary index of refraction, n_e, and the polymer has a refractive index, n_p, and where $n_o \neq n_p$.

36. (Withdrawn) The method of claim 33, wherein the peak wavelength of the reflected light shifts as the liquid crystal moves from a state having a first average index of refraction at the first applied electric field strength to a state having a second average index of refraction at the second applied electric field strength.

37. (Withdrawn) The method of claim 33, wherein the device exhibits a continuum of reflection wavelengths as the applied field strength is varied between the first and second applied field strengths.

38. (Withdrawn) The method of claim 33, wherein the reflection wavelength shifts to lower wavelength as the field strength is increased.

39. (Withdrawn) The method of claim 37, wherein the reflection wavelength shifts to higher wavelength as the field strength is increased.

40. (Withdrawn) The method of claim 33, wherein the bandwidth of reflected light varies as the applied field strength is varied between the first and second applied field strengths.

41. (Withdrawn) The method of claim 33, wherein the applied field strength is of sufficient strength to align the liquid crystal droplets to an extent sufficient to alter the LC index of refraction.

42. (Withdrawn) The method of claim 33 or 41, wherein the first applied electric field strength is zero.

43. (Withdrawn) The method of claim 33 or 41, wherein the applied electric field strength is in the range of about 0V to 240V.

44. (Withdrawn) The method of claim 33, wherein the liquid crystal further comprises a third average index of refraction substantially equal to the index of refraction of the polymer crystal.

45. (Withdrawn) A method of modifying reflection characteristics in an H-PDLC reflecting device, comprising:

providing a reflecting device comprising first and second substrates having a holographic polymer dispersed liquid crystal (H-PDLC) film disposed therebetween, the H-PDLC film comprised of layers of liquid crystal and polymer matrix, the liquid crystal having an average index of refraction, n_{LC}, and the polymer having an index of refraction, n_p; and

altering the electric field strength across the H-PDLC film to vary the index of refraction of the liquid crystal such that the H-PDLC film moves from a first index mismatch condition to a second index mismatch condition, each said index mismatch condition associated with a characteristic reflection characteristic of the H-PDLC film.

46. (Withdrawn) The method of claim 45, wherein the step of moving from a first index mismatch condition to a second index mismatch condition comprises moving through a index mismatching condition.

47. (Withdrawn) A method of electrically controlling a variable peak wavelength of a grating, comprising:

a periodic array of diffractive planes in a supporting matrix, said planes forming a grating spaced at a distance on the order of a wavelength of light and having an optical index responsive to an applied electric field; and

applying first and second applied electric field strengths to alter the peak wavelength of the grating.